CUTOUCH

user's manual

*****Warning!!!!!!!**
Please be careful to not touch the inverter with label DANGER.

About

CUTOUCH is an integration of Touch panel, graphic LCD, and CUBLOC embedded computer. In the recent years, there has been increase of use of touch screens in the industrial field. But to use one, the user required connecting to a PLC and learning to manipulate complex methods in order to use it. In addition, cost of touch screen has been very expensive.

Our CUTOUCH is a new type of embedded controller that integrates Touch screen, PLC, and graphic LCD into one.

The biggest difference between CUTOUCH and other touch screens is that it's the only Visual Touch screen controller that can be programmed with BASIC and LADDER in the world today.

BASIC language can be used to draw graphics and print characters to the LCD and receive input from the touch screen before processing the x and y positions. Sensor input through I/O, turning relays on/off, AD/DA conversion, and RS232 communication are very easy to implement in comparisons to traditional non-BASIC PLCs. With the LADDER LOGIC side of CUBLOC, the user may do sequential processing and real-time logic processing as in traditional PLCs.

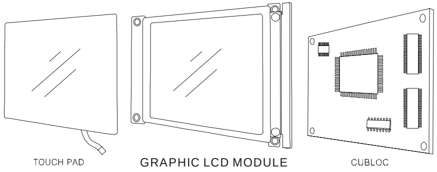
CUTOUCH has a flash memory for BASIC and LADDER programs. A serial port can be used to download and debug. After downloading is done, it can run in a "Stand-alone" state.

If you are thinking about developing a device that uses a touch screen, please review CUTOUCH and we guarantee you that it will let you spend more time designing, and less time to develop.

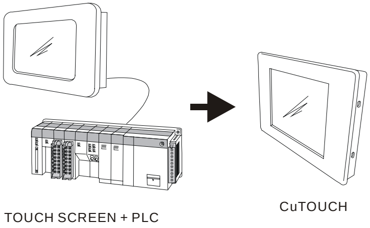
Comfile Technology Inc.

About CUTOUCH

CUTOUCH is an integration of CUBLOC core module, graphic LCD, and a touchpad. The graphic LCD portion is GHLCD. You can use the CUBLOC's GHLCD native commands to draw, and print to the CUTOUCH.



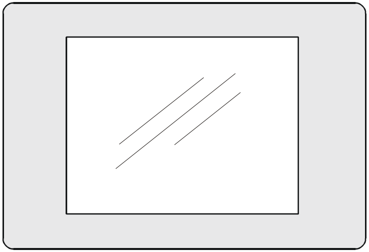
To implement a touch screen and PLC, it can add up to a big sum of money. But with CUTOUCH you do not need two different devices, you just need all-in-one device that will be less money in the long run.



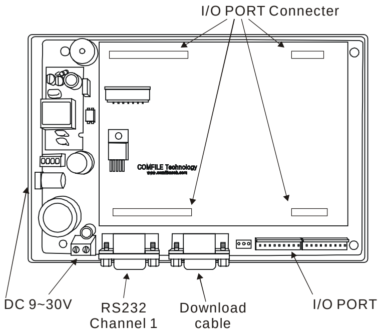
CuTOUCH

* DANGER!!!!!!! Please be careful near the inverter, where a DANGER label is located, large current flows through there!

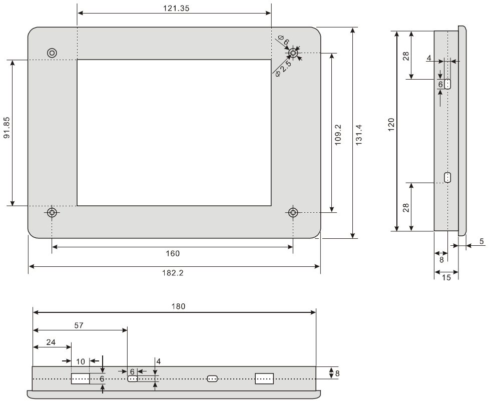
Front



Back

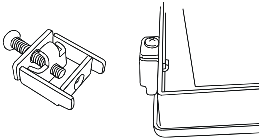


CuTOUCH Dimensions



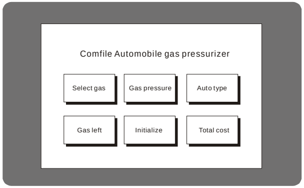
CuTOUCH Mounting Instruction

CuTOUCH comes with mounting brackets. Please install the mounting brackets as shown below before installing CuTOUCH.



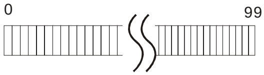
Menu System Library

CuTOUCH supports extra commands for easy-to-use menus. These commands make for easy creation and manipulation of the menus. With the menu system library, a menu system shown in the below picture can be made in less than 10 minutes.



MENU Commands

CUTOUCH has memory space for about 100 MENU buttons. Use MENUSET command to set the x and y axis positions and the style of the MENU. Then MENUTITLE command can be used to name the MENU. When touch input is received, MENUCHECK command can be used to find the appropriate MENU.



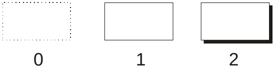
Each MENU button can be reset to another x and y axis positions and style by using MENUSET command. The only restriction is that up to 100 button can be inputted at time, meaning usually in one screen. But you are free to reset each button to another usage after each screen.

Menuset

MENUSET index, style, x1, y1, x2, y2

Index : Menu Index Number
Style : Button Style; 0=none, 1=Box, 2=Box with Shadow
X1,y1,x2,y2 : Menu Button location

Index value must be between 0~99. Style is the shape of the button where 0 is no box, 1 is for a box, and 2 is for a showed box.



x1,y1, x2, y2 are the x and y axis positions of the left upper and lower right corners. When this command is executed, the set part of the screen becomes part of the button's area.

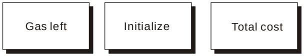
Menutitle

MENUTITLE index, x, y, string

Index :Menu index number
X,y : Title location based on left upper corner of button
string : Name of the menu

Menuset only draws the box itself. Use Menutitle command to set the name of the menu.

```
Menutitle 0,13,13,"Gas Left"
Menutitle 1,16,13,"Initialize"
Menutitle 2,13,13,"Total Cost"
```



Menucheck( )

Variable = MENUCHECK(index, touchx, touchy)

Variable : Variable to store results (1 if selected, 0 if unselected)
Index : Menu Index Number
Touchx : Touch pad x axis point
Touchy : Touch pad y axis point

Use this command Menucheck to see which menu is selected. Touchx and Touchy are the user's touchpad input points.

If the Menu is selected, 1 is returned, otherwise 0 is returned.

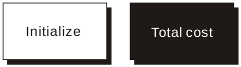
```
If Menucheck(0,TX1,TY1) = 1 Then
      Menureverse 0
      Beep 18,180
End If
```

Menureverse

MENUREVERSE index

Index : Menu index number

Selected menu box is inverted.



Waitdraw

WAITDRAW

This command will wait for a drawing command to finish before resuming execution.

```
    ELFILL  200,100,100,50   ‘ Fill an ellipse
    WAITDRAW                    ‘ Wait until drawing is finished.
```

This command is especially useful for animations and when you have trouble displaying graphics because of the speed.

CuTOUCH has an internal buffer for receiving graphic commands from CUBLOC. If this buffer fills up and data is sent to it, the data could get corrupted. In order to avoid these situations, you can use the WAITDRAW command to wait until the buffer has enough space before sending graphic commands.

If you need to draw graphics repeatedly, we recommend you use WAITDRAW to avoid situations where the LCD might get blurry or received noise.

This command can only be used with CuTOUCH.

Touch Pad Input Example

You can use SETPAD, ON PAD, and GETPAD commands to find out which menus were pressed from the user.

All PAD commands are geared for receiving and processing touch input.

We can use ON PAD interrupts to receive touch inputs. The following is an example program that uses the touch pad:

```
      '
      '  DEMO FOR CUTOUCH
      '
      Const Device = CT1700
      Dim TX1 As Word, TY1 As Word
      Set Pad 0,4,5            ‘← (1) Activate Touch PAD Input
      On Pad Gosub abc         ‘← (2) Declare pad interrupts
      Do
      Loop
abc:
      TX1 = Getpad(2)          ‘← (3) Interrupt Service routine
      TY1 = Getpad(2)
      Circlefill TX1,TY1,10    ‘← (4) Draw a circle where it
                               ‘      was touched
      Return
```

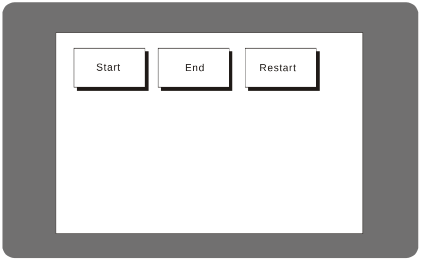
(1) SET PAD 0, 4, 5 : This command will activate the PAD inputs. (Syntax: SET PAD mode, packet size, buffer size). CuTOUCH has a separate touch controller that will sense touch input and send back to the CPU through SPI protocol. This “touch controller” will create a signal that is equal to mode = 0. (MSB, RISING EDGE sampling) Input packets are 4 bytes each (X and Y each get 2 bytes). Buffer size is 5, 1 more than the actual packet size.

(2) ON Pad Gosub ABC: This command is for PAD interrupt declaration. When PAD input occurs, it will jump to label ABC.

(3) This is interrupt service routine.   When PAD input occurs, this is part of the code until return will be executed.   Getpad will read the data received from touch pad, 2 bytes for x position and 2 bytes for y position.

(4) Draw a circle where touch input was received.
When this program is executed, you will be able to see that wherever you press on the screen, a circle will appear. Please use this program as a skeleton for your touch programs.
The following is MENU command and ON PAD command example: When button is pressed, a beep will sound from the piezo and the button will be inversed.

```
       '
       '   DEMO FOR CuTOUCH
       '
       Const Device = CT1700
       Dim TX1 As Integer, TY1 As Integer
       Dim k As Long
       Contrast 550
       Set Pad 0,4,5
       On Pad Gosub abc
       Menuset 0,2,8,16,87,63
       Menutitle 0,13,13,"Start"
       Menuset 1,2,96,16,176,63
       Menutitle 1,13,13,"End"
       Menuset 2,2,184,16,264,63
       Menutitle 2,13,13,"Restart"
       Low 18
       Do
       Loop
abc:
       TX1 = Getpad(2)
       TY1 = Getpad(2)
       Circlefill TX1,TY1,10
       If Menucheck(0,TX1,TY1) = 1 Then
             Menureverse 0
             Pulsout 18,300     ‘ Send out beep to piezo
       End If
       If Menucheck(1,TX1,TY1) = 1 Then
             Menureverse 1
             Pulsout 18,300
       End If
       If Menucheck(2,TX1,TY1) = 1 Then
             Menureverse 2
             Pulsout 18,300
       End If
       Return
```



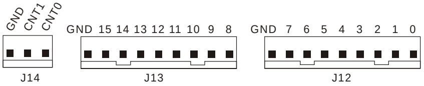
CuTOUCH I/O Ports

The CT1720 model CuTOUCH has 82 I/O ports while the CT1700 has 18 I/O ports.

Model Name	CT1700	CT1720
Input Only		32
Output Only		32
A/D Input	8	8
High Counter Input	2	2
Other I/Os	8	8
Total	18	82

CT1700

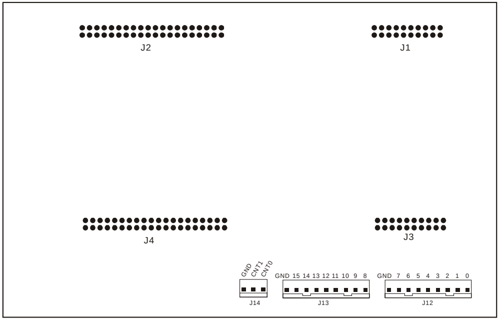
With 18 I/O ports, the CT1700 has connectors as shown below.

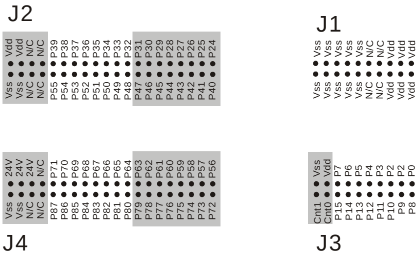


Connectors	Name	I/O	Port Block	Explanation
J12	P0	I/O	Block 0	ADC0
	P1	I/O		ADC1
	P2	I/O		ADC2
	P3	I/O		ADC3
	P4	I/O		ADC4
	P5	I/O		ADC5
	P6	I/O		ADC6
	P7	I/O		ADC7
K13	P8	I/O	Block 1	PWM0
	P9	I/O		PWM1
	P10	I/O		PWM2
	P11	I/O		PWM3
	P12	I/O		PWM4 / INT0
	P13	I/O		PWM5 / INT1
	P14	I/O		INT2
	P15	I/O		INT3
K14	P16	I/O		HIGH COUNT INPUT 0
	P17	I/O		HIGH COUNT INPUT 1
	P18	OUT		Internally connected to Piezo (Can’t be accessed with Ladder)

CT1720

With 82 I/O ports, the CT1720 has connectors as shown below.




J2
Vdd Vdd N/C N/C P39 P38 P37 P36 P35 P34 P33 P32 P31 P30 P29 P28 P27 P26 P25 P24
Vss Vss N/C N/C P55 P54 P53 P52 P51 P50 P49 P48 P47 P46 P45 P44 P43 P42 P41 P40
J1
Vss Vss Vss Vss Vss N/C N/C Vdd Vdd Vdd
Vss Vss Vss Vss Vss N/C N/C Vdd Vdd Vdd
24V 24V 24V N/C P71 P70 P69 P68 P67 P66 P65 P64 P63 P62 P61 P60 P59 P58 P57 P56
Vss Vss N/C N/C P87 P86 P85 P84 P83 P82 P81 P80 P79 P78 P77 P76 P75 P74 P73 P72
J4
Vss Vdd P7 P6 P5 P4 P3 P2 P2 P0
Cnt1 Cnt0 P15 P14 P13 P12 P11 P10 P9 P8
J3

Connector	Name	I/O	Port Block	Explanation
J12 (J3)	P0	I/O	Block 0	ADC0
	P1	I/O		ADC1
	P2	I/O		ADC2
	P3	I/O		ADC3
	P4	I/O		ADC4
	P5	I/O		ADC5
	P6	I/O		ADC6
	P7	I/O		ADC7
J13 (J3)	P8	I/O	Block 1	PWM0
	P9	I/O		PWM1
	P10	I/O		PWM2
	P11	I/O		PWM3
	P12	I/O		PWM4 / INT0
	P13	I/O		PWM5 / INT1
	P14	I/O		INT2
	P15	I/O		INT3
J14	P16	I/O		HIGH COUNT INPUT 0
	P17	IN		HIGH COUNT INPUT 1
	P18	OUTPUT		Internally connected to Piezo BUZZER (Cannot be accessed from Ladder)
	P19~P23			N/C
J2	P24~31	OUTPUT	Block 3	8 Output Ports
	P32~39	OUTPUT	Block 4	8 Output Ports
	P40~47	OUTPUT	Block 5	8 Output Ports
	P48~55	OUTPUT	Block 6	8 Output Ports
J4	P56~63	INPUT	Block 7	8 Input Ports
	P64~71	INPUT	Block 8	8 Input Ports
	P72~79	INPUT	Block 9	8 Input Ports
	P80~87	INPUT	Block 10	8 Input Ports

N/C (No Connection) means it's not used..

CuTOUCH I/O ports are natively 5V friendly, to input 24V or use relay, please use our CuTOUCH add-on board.

*If you input more than 5V into a CuTOUCH I/O port, it could cause the product to mal-function so please be careful.

Warning : CT1720 Output ports

Please be aware of the following when using CT1720 with output ports (24 through 55). When using CT1720 with a backup battery the data memory is saved during power OFF. Even the output on the I/O ports are saved to memory.

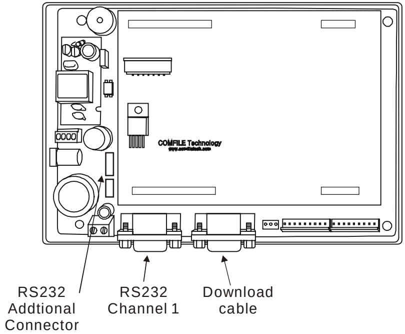
When powered ON, the output ports will recover from the status it was in at power OFF.

This is to let the modules be able to continue their existing processes in case of power outage.

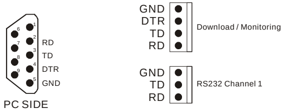
Please be aware that when there are unknown values and battery backup is used, there can be garbage values at power ON, meaning unknown values outputting on the output ports.

Please use regular I/O ports if you need to make sure that the output needs to be OFF at power ON.

There are extra RS232 connectors as shown below so you have the flexibility to be able to access CuTOUCH when in an enclosed area.



The Download RS232 Channel is a 4 pin type connector and RS232 Channel 1 is a 3 pin type connector as shown below. You can connect them to the PC SIDE RS232 Pins as shown below:



Relays

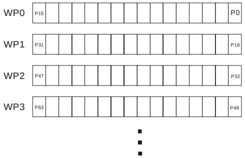
Relays that can be used in CuTOUCH are shown below. CuTOUCH has same structure as the CB290.

Relay	Range	Units	Feature
Input/Output Relay P	P0~P127	1 bit	Interface with external devices
Internal Relay M	M0~M1023	1 bit	Internal status
Special Relay F	F0~F127	1 bit	System status
Timer Relay T	T0~T255	16 bit (1 Word)	Timers
Counter C	C0~C255	16 bit (1 Word)	Counters
Step-Enable S	S0~S15	256 Steps(1 Byte)	Step-enable
Data D	D0~511	16 bit (1 Word)	Data Storage

P,M,F is in units of bits and T, C, and D are in units of Words. To access P, M, and F in units of Words, please use WP, WM, and WF, respectively.

Relay	Range	Units	Feature
WP	WP0~7	16 bit (1 Word)	P Access in units of Words
WM	WM0~WM63	16 bit (1 Word)	M Access in units of Words
WF	WF0~WF7	16 bit (1 Word)	F Access in units of Words

WP0 is equal to P0 through P15 put together. P0 is placed in the LSB (Least Significant Bit) and P15 is placed in the MSB (Most Significant Bit). Commands like WMOV can be used to easily manipulate these relay areas.



Backup Battery

CuTOUCH will maintain data in its data memory after power OFF by using its backup battery. If backup is not needed, the program must clear the memory at the beginning of the program. In BASIC, RAMCLEAR command can be used to clear all data memory at the start of the program.

```
'
'  DEMO FOR CUTOUCH
'
Const Device = CT1700
Dim TX1 As Word, TY1 As Word
TX1 = 0
TY1 = 0   ‘ Clear just this variable
RAMCLEAR    ‘ Clear all RAM
```

For LADDER, all relays S, M, C, T, and D are backed up by the backup battery. Relay P is cleared at power ON by default. If you only want to clear parts of the relay, not all relays, you can use the following method to clear:

```
Const Device = CT1700
Dim I As Integer
For I=0 to 32            ‘ Clear only relay M0 to M32
      _M(I) = 0
Next
Set Ladder On
```

Most traditional PLCs have KEEP memory for storing and restoring data in case of power down. CuTOUCH also has this feature by using a super capacitor, which recharges itself and acts as a backup battery. You also have the option of using larger capacity capacitor or an actual battery.

KEEP Timer and KEEP Counter

KEEP timer will retain its data values when powered off and restart from the data values when power is turned on. KCTU and KCTD commands can be used in place of CTU and CTD commands in order to make use of this KEEP timer and KEEP counter. Please refer to KCTU, KCTD commands for detailed information.

MEMO

MEMO

MEMO

CUTOUCH Sample Program

SAMPLE 1

Let’s make a simple counter that will print to the screen. The source files used here are in your CUBLOC Studio installation directory. (Usually C:\Program Files\Comfile Tools\CublocStudio)

<Filename : CT001.CUL>

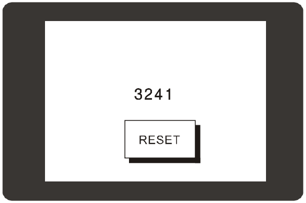
```
Const Device = Ct1700
Dim I As Integer
Contrast 550 ' LCD CONTRAST SETTING

Do
      Locate 15,6
      Print DEC5 I
      Incr I
      Delay 200
Loop
```

Please adjust your screen’s contrast accordingly using CONTRAST command.
* Depending on the model, you may be able to adjust the contrast using a adjustable knob on the back of CuTOUCH. In this case, you have the option to set the contrast manually.

SAMPLE 2

The following example program will display RESET button and will increment number shown every time the button is pressed.



<Filename : CT002.CUL>

```
      Const Device = Ct1700
      Dim I As Integer
      Dim TX1 As Integer, TY1 As Integer
      Contrast 550
      Set Pad 0,4,5
      On Pad Gosub GETTOUCH
      Menuset 0,2,120,155,195,200
      Menutitle 0,20,14,"RESET"

      Do
            Locate 15,6
            Print DEC5 I
            Incr I
            Delay 200
      Loop

GETTOUCH:
      TX1 = Getpad(2)
      TY1 = Getpad(2)
      If Menucheck(0,TX1,TY1) = 1 Then
            Pulsout 18,300
```

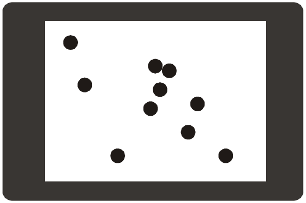
```
            I = 0
      End If
      Return
```

SET PAD command activates touch input. ON PAD command is used to jump to a label when touch input is received. MENUSET command is used to set the desired touch input area and MENUTITLE command is used to set the name of the button itself.

PULSEOUT outputs BEEP sound to the piezo.

SAMPLE 3

Draw a circle where your finger touches.



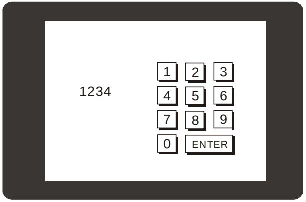
<Filename : CT003.CUL>

```
      Const Device = Ct1700
      Dim TX1 As Integer, TY1 As Integer
      Contrast 550
      Set Pad 0,4,5
      On Pad Gosub GETTOUCH
      Do
      Loop

GETTOUCH:
      TX1 = Getpad(2)
      TY1 = Getpad(2)
      Circlefill TX1,TY1,10
      Pulsout 18,300
      Return
```

SAMPLE 4

Make a virtual keypad and accept numerical values.



<Filename : CT004.CUL>

```
      Const Device = Ct1700
      Dim TX1 As Integer, TY1 As Integer
      Dim I As Integer
      Contrast 550
      Set Pad 0,4,5
      On Pad Gosub GETTOUCH
      Menuset 0,2,165,50,195,75
      Menutitle 0,11,4,"1"
      Menuset 1,2,205,50,235,75
      Menutitle 1,11,4,"2"
      Menuset 2,2,245,50,275,75
      Menutitle 2,11,4,"3"
      Menuset 3,2,165,85,195,110
      Menutitle 3,11,4,"4"
      Menuset 4,2,205,85,235,110
      Menutitle 4,11,4,"5"
      Menuset 5,2,245,85,275,110
      Menutitle 5,11,4,"6"
      Menuset 6,2,165,120,195,145
      Menutitle 6,11,4,"7"
      Menuset 7,2,205,120,235,145
      Menutitle 7,11,4,"8"
      Menuset 8,2,245,120,275,145
      Menutitle 8,11,4,"9"
      Menuset 9,2,165,155,195,180
      Menutitle 9,11,4,"0"
      Menuset 10,2,205,155,275,180
      Menutitle 10,17,4,"ENTER"

      I =0
      Do
      Loop

GETTOUCH:
      TX1 = Getpad(2)
      TY1 = Getpad(2)
      If Menucheck(0,TX1,TY1) = 1 Then
            I = I << 4
            I = I + 1
            Pulsout 18,300
      Elseif Menucheck(1,TX1,TY1) = 1 Then
            I = I << 4
            I = I + 2
            Pulsout 18,300
      Elseif Menucheck(2,TX1,TY1) = 1 Then
            I = I << 4
            I = I + 3
            Pulsout 18,300
      Elseif Menucheck(3,TX1,TY1) = 1 Then
            I = I << 4
            I = I + 4
            Pulsout 18,300
      Elseif Menucheck(4,TX1,TY1) = 1 Then
            I = I << 4
            I = I + 5
            Pulsout 18,300
      Elseif Menucheck(5,TX1,TY1) = 1 Then
            I = I << 4
            I = I + 6
            Pulsout 18,300
      Elseif Menucheck(6,TX1,TY1) = 1 Then
            I = I << 4
```

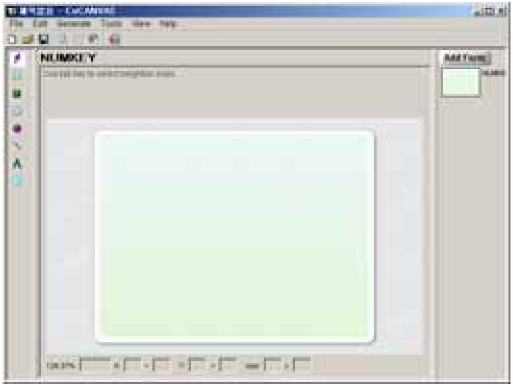
```
            I = I + 7
            Pulsout 18,300
      Elseif Menucheck(7,TX1,TY1) = 1 Then
            I = I << 4
            I = I + 8
            Pulsout 18,300
      Elseif Menucheck(8,TX1,TY1) = 1 Then
            I = I << 4
            I = I + 9
            Pulsout 18,300
      Elseif Menucheck(9,TX1,TY1) = 1 Then
            I = I << 4
            Pulsout 18,300
      Elseif Menucheck(10,TX1,TY1) = 1 Then
            I = 0
            Pulsout 18,300
      End If
      Locate 3,3
      Print HEX4 I
      Return
```

The final value I is stored as BCD code, you can use BCD2BIN command to convert back to a binary number.

SAMPLE 5

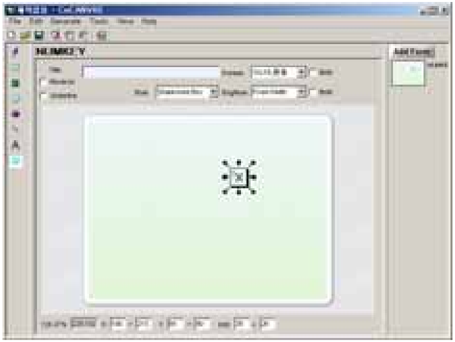
Let’s try using CuCANVAS to make some menus. To create the virtual keypad shown in the previous page, it would take a longer time to just code it. We can save ourselves time by using CuCANVAS.

Please run CuCANVAS and press Add Form button on the upper right hand corner. Enter a desired name for your new form. (Here we used NUMKEY)

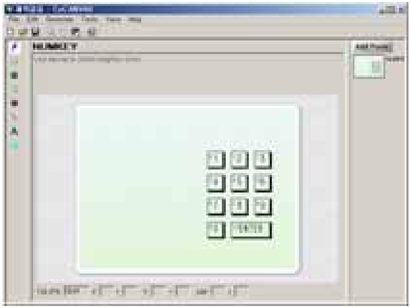


On the left side of CuCANVAS, you will see a tool bar with an arrow, box, filled box, circle, filled circle, line, text, and menu box. Please select the last button, menu box, and draw a small box on the screen.

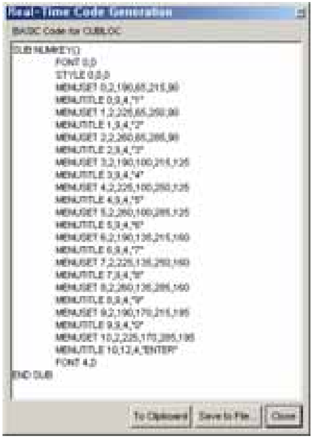
The 0 on the button means the menu number is 0. In the actual screen, this number will not be displayed. Type “1” in the Title field on the top. You have successfully made a “1” button.



You can make the rest of the buttons and the keypad like the one shown below can be made in less than 5 minutes.



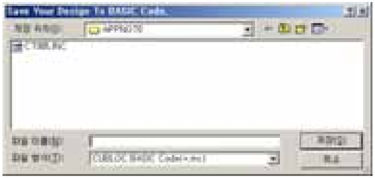
Now is the fun part. Simply click on Generate on the menu bar and click “View Basic Code”. CuCANVAS will generate a sub function that includes the button that you have just created. Simply copy(Ctrl+C) and paste(CTRL+V) to CUBLOC Studio and wala! You have a menu in couple minutes. For copying, you can either press Ctrl+C or press on the “To Clipboard” button at the bottom.



```
SUB NUMKEY()
        FONT 0,0
        STYLE 0,0,0
        MENUSET 0,2,190,65,215,90
        MENUTITLE 0,9,4,"1"
        MENUSET 1,2,225,65,250,90
        MENUTITLE 1,9,4,"2"
        MENUSET 2,2,260,65,285,90
        MENUTITLE 2,9,4,"3"
        MENUSET 3,2,190,100,215,125
        MENUTITLE 3,9,4,"4"
        MENUSET 4,2,225,100,250,125
        MENUTITLE 4,9,4,"5"
        MENUSET 5,2,260,100,285,125
        MENUTITLE 5,9,4,"6"
        MENUSET 6,2,190,135,215,160
        MENUTITLE 6,9,4,"7"
        MENUSET 7,2,225,135,250,160
        MENUTITLE 7,9,4,"8"
        MENUSET 8,2,260,135,285,160
        MENUTITLE 8,9,4,"9"
        MENUSET 9,2,190,170,215,195
        MENUTITLE 9,9,4,"0"
        MENUSET 10,2,225,170,285,195
        MENUTITLE 10,13,4,"ENTER"
        FONT 4,0
END SUB
```

You can also use include files instead of copying and pasting for repetitive menu creations.

Click “Save to File” button and save as an include (*.inc) file.



Using the include file, you will be able to save lots of time and be able to make changes to your menus without making it a big copy and paste hassle.

The following program is exactly same as SAMPLE4 except we use include file for the virtual keypad.

<Filename : CT005.CUL>

```
        Const Device = Ct1700
        Dim TX1 As Integer, TY1 As Integer
        Dim I As Integer
        Contrast 550
        Set Pad 0,4,5
        On Pad Gosub GETTOUCH
        NUMKEY              ' Execute the Sub-routine in INCLUDE file
        I =0
        Do
        Loop

GETTOUCH:
        TX1 = Getpad(2)
        TY1 = Getpad(2)
        If Menucheck(0,TX1,TY1) = 1 Then
                I = I << 4
                I = I + 1
                Pulsout 18,300
        Elseif Menucheck(1,TX1,TY1) = 1 Then
```

```
            I = I << 4
            I = I + 2
            Pulsout 18,300
      Elseif Menucheck(2,TX1,TY1) = 1 Then
            I = I << 4
            I = I + 3
            Pulsout 18,300
      Elseif Menucheck(3,TX1,TY1) = 1 Then
            I = I << 4
            I = I + 4
            Pulsout 18,300
      Elseif Menucheck(4,TX1,TY1) = 1 Then
            I = I << 4
            I = I + 5
            Pulsout 18,300
      Elseif Menucheck(5,TX1,TY1) = 1 Then
            I = I << 4
            I = I + 6
            Pulsout 18,300
      Elseif Menucheck(6,TX1,TY1) = 1 Then
            I = I << 4
            I = I + 7
            Pulsout 18,300
      Elseif Menucheck(7,TX1,TY1) = 1 Then
            I = I << 4
            I = I + 8
            Pulsout 18,300
      Elseif Menucheck(8,TX1,TY1) = 1 Then
            I = I << 4
            I = I + 9
            Pulsout 18,300
      Elseif Menucheck(9,TX1,TY1) = 1 Then
            I = I << 4
            Pulsout 18,300
      Elseif Menucheck(10,TX1,TY1) = 1 Then
            I = 0
            Pulsout 18,300
      End If
      Locate 3,3
      Print HEX4 I
```

```
      Return

      End

#INCLUDE "CT005.INC"
```

We must include #include command at the end of the code. Slightly different from other languages such as C++, but it works.

You can see a call to the NUMKEY function at the beginning of the program, which calls the created source code to generate the virtual keypad.

Errata

Please refer to this errata file for bugs and fixes no shown in the manual.

Disclaimer of Liability: We will not be responsible for any damage occurring from reader's neglect of reading the errata file.

Please read the errata carefully in order to be aware of version changes.

Warning : CB290 / CT1720 Output ports

Please be aware of the following when using CB290 or CT1720 with output ports (24 through 55).

When using CB290 or CT1720 with a backup battery (CB290 Proto-Board, BaseBoard 64T, and CT1720), the data memory is saved during power OFF. Even the output on the I/O ports are saved to memory.

When powered ON, the output ports will recover from the status it was in at power OFF.

This is to let the modules be able to continue their existing processes in case of power outage.

Please be aware that when there are unknown values and battery backup is used, there can be garbage values at power ON, meaning unknown values outputting on the output ports.

Please use regular I/O ports if you need to make sure that the output needs to be OFF at power ON.